

\$25.00

BALDOR[®]
MOTORS AND DRIVES

**DC Tachometer
Expansion Board**

Catalog No. EXB006A01

Installation and Operating Manual

5/96

MN1311

Table of Contents

Section 1	
General Information	1-1
Introduction	1-1
Limited Warranty	1-2
Safety Notice	1-3
Precautions	1-3
Section 2	
Expansion Board Description	2-1
Introduction	2-1
Section 3	
Installation	3-1
Board Installation	3-1
1-15HP Size A and B Controls	3-2
Single Expansion Board Installation	3-2
Dual Expansion Board Installation	3-4
15HP Size C and Larger AC Controls	3-6
Single Expansion Board Installation	3-6
Dual Expansion Board Installation	3-8
SCR DC Controls	3-10
Single Expansion Board Installation	3-10
Dual Expansion Board Installation	3-11
Section 4	
Hardware Setup	4-1
Connections	4-1
Jumper Settings	4-3
Section 5	
Software Setup	5-1
Configure Control Software for DC Tachometer	5-1

Section 1

General Information

Introduction

The Baldor controls represent the latest technology in microprocessor based motor controls. In addition to the user programmable parameters available in every control, many different expansion boards are available from Baldor to further customize the control to most any application.

Expansion boards are categorized by compatibility into two groups: Group 1 and Group 2, see Table 1-1. A board from either group may be used alone in a control. If two boards are to be used, one board must be from Group 1 and the other from Group 2.

Note: Using two Group 1 or two Group 2 boards in the same control is not allowed.

Table 1-1 Group 1 and Group 2 Board Categories

Group 1 Board Name	Catalog No.	Baldor Manual No.
Isolated Input Expansion Board	EXB003A01	MN1314
Master Pulse Reference/ Isolated Pulse Follower	EXB005A01	MN1312
DC Tachometer Interface	EXB006A01	MN1311
Isolated Encoder Expansion Board	EXB008A01	MN1317
Resolver to Digital Interface	EXB009A01	MN1313
Group 2 Board Name		
RS-232 Serial Communication	EXB001A01	MN1310
RS-422/RS-485 High Speed Serial Communication	EXB002A01	MN1310
Four Output Relays/3-15 PSI Pneumatic Expansion Board	EXB004A01	MN1315
High Resolution Analog I/O Expansion Board	EXB007A01	MN1316
2 Isolated Analog Output/ 3 Relay Output Expansion Board	EXB010A01	MN1319

Limited Warranty

For a period of two (2) years from the date of original purchase, BALDOR will repair or replace without charge controls and accessories which our examination proves to be defective in material or workmanship. This warranty is valid if the unit has not been tampered with by unauthorized persons, misused, abused, or improperly installed and has been used in accordance with the instructions and/or ratings supplied. This warranty is in lieu of any other warranty or guarantee expressed or implied. BALDOR shall not be held responsible for any expense (including installation and removal), inconvenience, or consequential damage, including injury to any person or property caused by items of our manufacture or sale. (Some states do not allow exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply.) In any event, BALDOR's total liability, under all circumstances, shall not exceed the full purchase price of the control. Claims for purchase price refunds, repairs, or replacements must be referred to BALDOR with all pertinent data as to the defect, the date purchased, the task performed by the control, and the problem encountered. No liability is assumed for expendable items such as fuses.

Goods may be returned only with written notification including a BALDOR Return Authorization Number and any return shipments must be prepaid.

Safety Notice

This equipment contains voltages that may be as great as 1000 volts! Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt the start-up procedure or troubleshoot this equipment.

This equipment may be connected to other machines that have rotating parts or parts that are driven by this equipment. Improper use can cause serious or fatal injury. Only qualified personnel should attempt the start-up procedure or troubleshoot this equipment.

PRECAUTIONS

⚠ WARNING: Do not touch any circuit board, power device or electrical connection before you first ensure that power has been disconnected and there is no high voltage present from this equipment or other equipment to which it is connected. Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt the start-up procedure or troubleshoot this equipment.

⚠ WARNING: Be sure that you are completely familiar with the safe operation of this equipment. This equipment may be connected to other machines that have rotating parts or parts that are controlled by this equipment. Improper use can cause serious or fatal injury. Only qualified personnel should attempt the start-up procedure or troubleshoot this equipment.

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- ⚠ WARNING:** Be sure the system is properly grounded before applying power. Do not apply AC power before you ensure that all grounding instructions have been followed. Electrical shock can cause serious or fatal injury.
- ⚠ WARNING:** Do not remove cover for at least five (5) minutes after AC power is disconnected to allow capacitors to discharge. Dangerous voltages are present inside the equipment. Electrical shock can cause serious or fatal injury.
- ⚠ WARNING:** Improper operation of control may cause violent motion of the motor shaft and driven equipment. Be certain that unexpected motor shaft movement will not cause injury to personnel or damage to equipment. Peak torque of several times the rated motor torque can occur during control failure.
- ⚠ WARNING:** Motor circuit may have high voltage present whenever AC power is applied, even when motor is not rotating. Electrical shock can cause serious or fatal injury.
- ⚠ Caution:** To prevent equipment damage, be certain that the electrical service is not capable of delivering more than the maximum line short circuit current amperes listed in the appropriate control manual, 230 VAC, 460 VAC or 575 VAC maximum per control rating.

Section 2

Expansion Board Description

Introduction

DC Tachometer Expansion Board

Catalog No. EXB006A01

Group 1 Expansion Board

The DC Tachometer expansion board provides closed loop operation for Baldor DC SCR series drives. The DC Tach can also be used with Series 15H or 21H Inverter controls, Series 18H or 22H Vector controls or a Series 19H or 20H DC SCR control for PID control.

When using a DC Tachometer board as an input for the process control mode, an encoder should be used as velocity feedback to the control. (Armature feedback can be used but performance would suffer.) The DC Tach may be used in a process control mode as either process feedback or setpoint source.

Section 3 Installation

Board Installation

This section describes the Expansion Board installation procedure.

Caution: **Before you proceed, be sure to read and become familiar with the safety precautions at the beginning of this manual. Do not proceed if you are unsure of the safety precautions described. If you have any questions, contact BALDOR before you proceed.**

1. Remove the expansion board from the shipping container.
2. Remove all packing material from the board.

Caution: **Be sure all packing materials are removed from the board. Conductive foam may be present on the connectors to prevent static build up during shipping. This can prevent proper circuit operation.**

Installation differs between the 1-15 HP Size A and B controls and the 15HP Size C and larger AC controls and the SCR DC controls. If you are installing only one board, refer to the "Single Expansion Board Installation" procedure. If you are installing two expansion boards (or a second board) refer to the "Dual Expansion Board Installation" procedure.

1-15HP Size A and B Controls

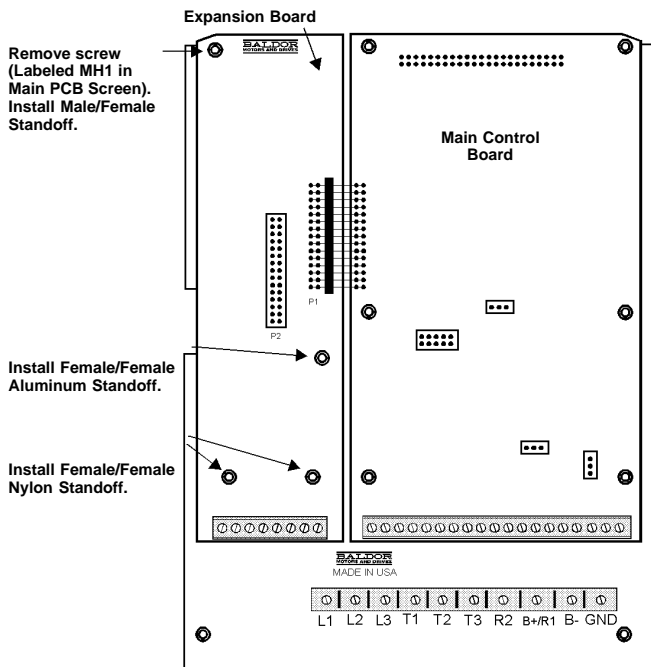
(For all 15H Inverter, 18H Vector, and 23H Servo).

Single Expansion Board Installation

Procedure:

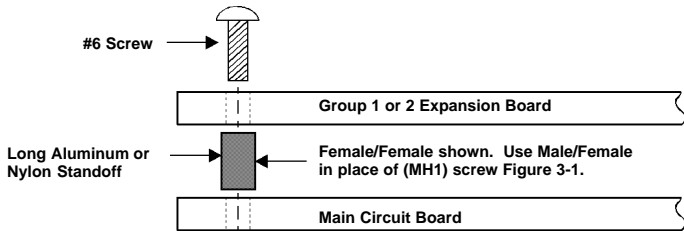
1. Be sure drive operation is terminated and secured.
2. Remove all power sources from the control.
3. Wait at least 5 minutes for internal capacitors to discharge.
4. Remove the four (4) Phillips head screws that secure the control cover.
5. Remove the control cover.
6. Remove the #6 screw at position MH1 (upper left on the main circuit board. See Figure 3-1.
7. Install the long standoffs provided in the installation hardware as shown in Figure 3-1. (Be sure the Male/Female standoff is at position MH1. The other three are Female/Female.)
8. Slide the expansion board male connector into the female connector of the control board.
9. Securely mount the expansion board to the standoffs installed in step 7 using #6 screws provided in the installation hardware. See Figure 3-2.
10. The mechanical installation of the expansion board is now complete. Refer to Section 4 of this manual and configure the jumpers as desired. Also complete the wiring before you proceed to step 11.
11. When complete, install the control cover using the four (4) Phillips head screws.
12. Restore all power sources to the control.
13. Restore drive operation.

Figure 3-1 Single Expansion Board Installation



Terminal tightening torque is 7 lb-in (0.8 Nm) maximum.

Figure 3-2 Single Expansion Board Installation



1-15HP Size A and B Controls (Continued)

Dual Expansion Board Installation

Procedure:

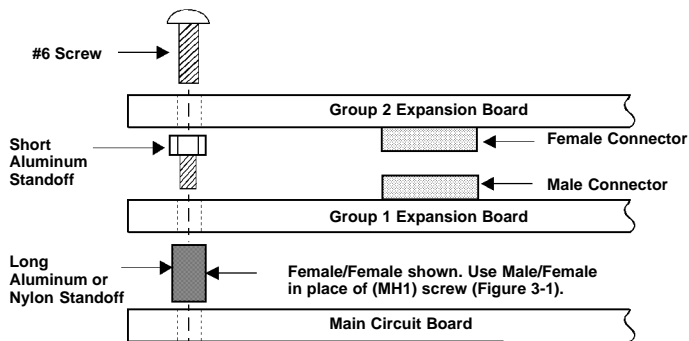
1. Be sure drive operation is terminated and secured.
2. Remove all power sources from the control.
3. Wait at least 5 minutes for internal capacitors to discharge.
4. Remove the four (4) Phillips head screws that secure the control cover.
5. Remove the control cover.
6. Remove the #6 screw at position MH1 (upper left on the main circuit board. See Figure 3-1.
7. Install the long standoffs provided in the installation hardware as shown in Figure 3-1. (Be sure the Male/Female standoff is at position MH1. The other three are Female/Female.)
8. Slide the Group 1 board male connector into the female connector of the control board. See Figure 3-3.
9. Securely mount the Group 1 expansion board to the standoffs installed in step 7 using the 4 short aluminum standoffs provided in the installation hardware. See Figure 3-3.
10. The mechanical installation of the Group 1 expansion board is now complete. Refer to the manual for the Group 1 board and configure the jumpers as desired. Also complete the wiring before you proceed to step 11.
11. Install the Group 2 board on top of the previously installed Group 1 board by plugging the female connector onto the male connector of the Group 1 board as shown in Figure 3-3.
12. Secure this Group 2 board to the Group 1 board using the #6 screws provided.

1-15HP Size A and B Controls

Dual Expansion Board Installation (Continued)

13. The mechanical installation of the first expansion board is now complete. Refer to the manual for the Group 2 board and configure any jumpers and switches as desired. Also complete the wiring for this board before you install the cover.
14. When complete, install the control cover using the four (4) Phillips head screws.
15. Restore all power sources to the control.
16. Restore drive operation.

Figure 3-3 Dual Expansion Board Installation



15HP Size C and Larger AC Controls

(For all 15H Inverter, 21H Line Regen Inverter, 18H Vector, 22H Line Regen Vector and 23H Servo).

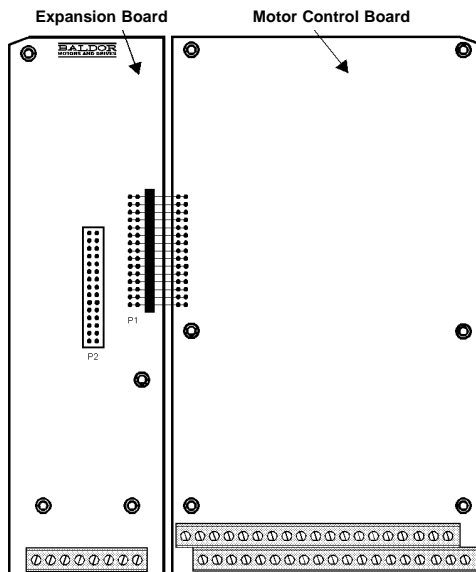
Single Expansion Board Installation

Procedure:

1. Be sure drive operation is terminated and secured.
2. Remove all power sources from the control.
3. Wait at least 5 minutes for internal capacitors to discharge.
4. Remove the four (4) Phillips head screws ($1/4$ turn) that secure the control cover. (On floor mounted G size enclosures, open the enclosure door).
5. Remove the control cover.
6. Slide the expansion board male connector into the female connector of the control board. See Figure 3-4.
7. Securely mount the expansion board to the sheet metal mounting plate using the #6 screws provided in the installation hardware. See Figure 3-5.
8. The mechanical installation of the expansion board is now complete. Refer to Section 4 of this manual and configure the jumpers as desired. Also complete the wiring before you proceed to step 9.
9. When complete, install the control cover using the four (4) Phillips head screws ($1/4$ turn). (On floor mounted G size enclosures, close the enclosure door).
10. Restore all power sources to the control.
11. Restore drive operation.

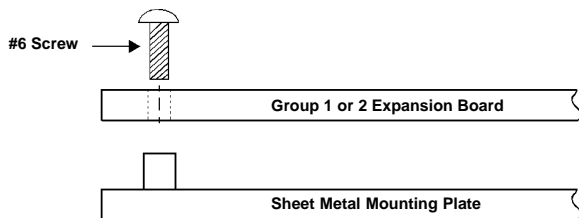
15HP Size C and Larger AC Controls Single Expansion Board Installation (Continued)

Figure 3-4 Single Expansion Board Installation



Terminal tightening torque is 7 lb-in (0.8 Nm) maximum.

Figure 3-5 Single Expansion Board Installation



15HP Size C and Larger AC Controls (Continued)

Dual Expansion Board Installation

Procedure:

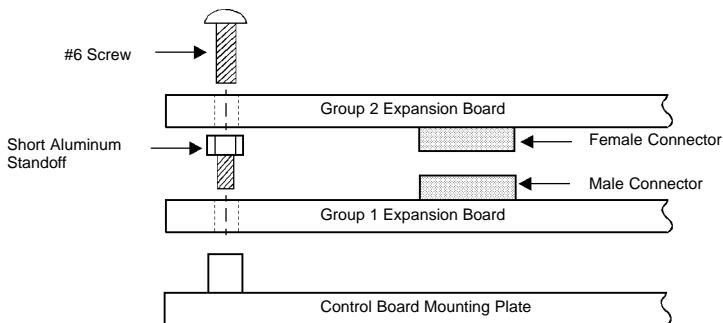
1. Be sure drive operation is terminated and secured.
2. Remove all power sources from the control.
3. Wait at least 5 minutes for internal capacitors to discharge.
4. Remove the four (4) Phillips head screws ($1/4$ turn) that secure the control cover. (On floor mounted G size enclosures, open the enclosure door).
5. Remove the control cover.
6. Slide the Group 1 expansion board male connector into the female connector of the control board. See Figure 3-4.
7. Securely mount the Group 1 expansion board to the sheet metal mounting plate using the short standoffs provided in the installation hardware. See Figure 3-6.
8. The mechanical installation of the expansion board is now complete. Refer to the manual for the Group 1 board and configure the jumpers as desired. Also complete the wiring before you proceed to step 9.
9. Install the Group 2 board on top of the previously installed Group 1 board by plugging the female connector onto the male connector of the Group 1 board as shown in Figure 3-6.
10. Secure this Group 2 board to the Group 1 board using the #6 screws provided. See Figure 3-6.
11. The mechanical installation of the expansion board is now complete. Refer to the manual for the Group 2 board and configure any jumpers and switches as desired. Also complete the wiring for this board before you install the cover.

15HP Size C and Larger AC Controls

Dual Expansion Board Installation (Continued)

- When complete, install the control cover using the four (4) Phillips head screws ($1/4$ turn). (On floor mounted G size enclosures, close the enclosure door).
- Restore all power sources to the control.
- Restore drive operation.

Figure 3-6 Dual Expansion Board Installation



SCR DC Controls

(For 19H and 20H SCR DC Controls).

Single Expansion Board Installation

Procedure:

1. Be sure drive operation is terminated and secured.
2. Remove all power sources from the control.
3. Wait at least 5 minutes for internal capacitors to discharge.
4. Slide the expansion board male connector into the female connector of the control board. See Figure 3-4.
5. Securely mount the expansion board to the sheet metal mounting plate using the #6 screws provided in the installation hardware. See Figure 3-5.
6. The mechanical installation of the expansion board is now complete. Refer to the Group 1 manual and configure the jumpers as desired. Also complete the wiring before you proceed to step 7.
7. Restore all power sources to the control.
8. Restore drive operation.

SCR DC Controls (Continued)

Dual Expansion Board Installation

Procedure:

1. Be sure drive operation is terminated and secured.
2. Remove all power sources from the control.
3. Wait at least 5 minutes for internal capacitors to discharge.
4. Slide the Group 1 board male connector into the female connector of the control board. See Figure 3-4.
5. Securely mount the Group 1 expansion board to the sheet metal mounting plate using the short standoffs provided in the installation hardware. See Figure 3-6.
6. The mechanical installation of the expansion board is now complete. Refer to the Group 1 manual and configure the jumpers as desired. Also complete the wiring before you proceed to step 7.
7. Install the Group 2 board on top of the previously installed Group 1 board by plugging the female connector onto the male connector of the Group 1 board as shown in Figure 3-6.
8. Secure this Group 2 board to the Group 1 board using the #6 screws provided. See Figure 3-6.
9. The mechanical installation of the expansion board is now complete. Refer to the manual for the Group 2 board and configure any jumpers and switches as desired. Also complete the wiring for this board before you proceed to step 10.
10. Restore all power sources to the control.
11. Restore drive operation.

Section 4

Hardware Setup

Connections

⚠ WARNING: High voltage is present on the DC Tachometer expansion board. Do not touch any circuit board, power device or electrical connection before you first ensure that power has been disconnected and there is no high voltage present from this equipment or other equipment to which it is connected. Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt the start-up procedure or troubleshoot this equipment.

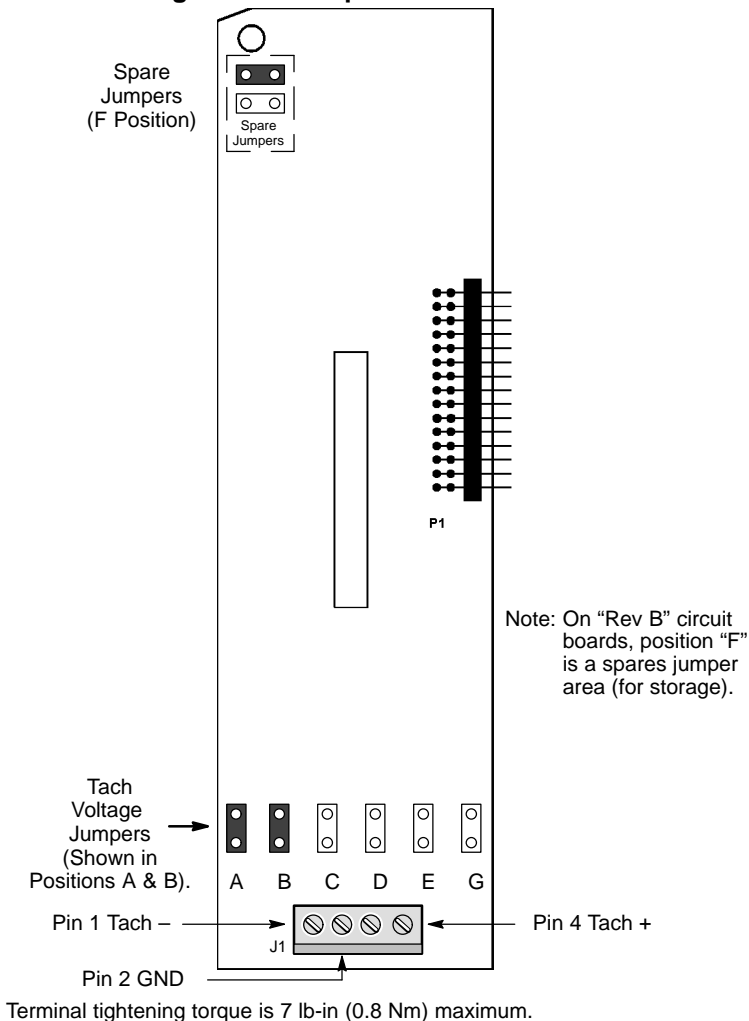
Procedure: (Refer to Figure 4-1.)

1. Connect the motor's negative DC Tachometer lead to J1 terminal 1 of the DC Tachometer board.
2. Connect the motor's positive DC Tachometer lead to J1 terminal 4 of the DC Tachometer board.
3. Connect the ground lead to J1 terminal 2 of the DC Tachometer board.

Note: With the motor running in the FWD direction, Pin 4 is positive (+) and pin 1 is negative (-). Pin 2 is ground.

When the DC Tachometer is used for velocity feedback with a DC SCR Control, if the polarity is reversed, the control will attempt to run the motor at maximum speed. If this happens, reverse the tachometer leads at pins 1 and 4 of the expansion board.

Figure 4-1 Jumper and Terminal Locations



Jumper Settings

The DC Tachometer board has a maximum input of 250VDC. The input voltage to the expansion board can be calculated as follows:

$$\frac{\text{Maximum Motor Speed (RPM)} \times \text{Tachometer output (V/1000 RPM)}}{1000}$$

Example:

Maximum motor speed is 2300 RPM. Tachometer output voltage is 50V/1000 RPM. The tach output at maximum speed is:

$$\frac{2300 \text{ (RPM)} \times 50 \text{ (V/1000 RPM)}}{1000} = 115$$

The tach output at maximum speed is 115 V. Allowing for 20% extra voltage, the proper setting for the Tach Voltage Jumpers is 140V (see Table).

Procedure:

Calculate the input voltage for your application. Place the Tach Voltage Jumpers in the proper positions.

Table 4-1 Tach Voltage Jumper Positions

Maximum Tach Voltage	Jumper Position
250V	A
140V (Factory Setting)	A, B
80V	A, C
55V	A, D
40V	A, C, D
25V	A, E
Direct	G

Note: "Direct" input allows a bipolar (± 10 VDC maximum) input signal instead of the tach input.

Proper selection of the input voltage jumper position allows for overspeed, 120% as shown in the example. The Series 19H and 20H DC SCR controls automatically calculate the expansion board jumper setting when the “Autotune Calc Presets” function is executed, or whenever the MAX SPEED or TACH VOLTAGE parameters are changed. If the calculated value is not the same as the present setting, a fault message “CHK Tach Jumpers” will be displayed.

When a fault is displayed, the correct jumper setting is displayed in the Diagnostic information, TACH BOARD INFO parameter value. Examine this parameter value and the control will tell you which jumper positions to use.

Note: The Maximum Tach Voltages shown in Table 4-1 are the maximum voltage allowed at the input to the DC Tachometer Expansion Board. If the input voltage exceeds this value (140VDC for our example) an Overspeed Fault will occur.

Section 5

Troubleshooting

Configure for DC Tachometer as Speed Feedback for DC Motor

After the DC Tachometer board has been installed and the jumpers are correctly placed, the control software must be configured so it will recognize the expansion board. This is done by changing the value of the Level 2 MOTOR DATA Block, “Feedback Type” parameter (P2507) to “TACHOMETER”. Parameter value choices are:

- Armature
- Encoder
- Tachometer
- Resolver

The value of the Level 2 MOTOR DATA Block, “Tachometer Volts” parameter (P2510) must also be set to the appropriate DC Tach Volts/1000 RPM value.

Procedure: (Series 19H or 20H DC SCR Controls)

1. At the keypad, access the Level 2 Blocks.
2. Scroll to and access the Motor Data Block.
3. Access the Feedback Type parameter.
Change its' value to TACHOMETER.
4. Access the Tachometer Volts parameter.
Change its' value to the Volts/1000 RPM rating of the DC Tachometer.

Note: If a Tach expansion board is not installed and TACHOMETER is selected as the value of the Level 2 MOTOR DATA Block, “Feedback Type” parameter (P2507), an EXP BOARD FAULT will occur. This fault will also force the control to change the parameter value to ARMATURE.

Note: When a Feedback Type other than Tachometer is selected, the Diagnostic TACH BOARD INFO will display NONE for the voltage and jumpers.

Configure for DC Tachometer as Feedback for Process Control Mode

After the DC Tachometer board has been installed and the jumpers are correctly placed, the control software must be configured so it will recognize the expansion board. This is done by changing the value of the Level 2 MOTOR DATA Block, “Feedback Type” parameter (P2507) to “TACHOMETER”.

The value of the Level 2 MOTOR DATA Block, “Tachometer Volts” parameter (P2510) must also be set to the appropriate DC Tach Volts/1000 RPM value. The DC Tach can be used as either Process Feedback or Setpoint Source.

Procedure: (Series 19H or 20H DC SCR Controls)

1. At the keypad, access the Level 2 Blocks.
2. Scroll to and access the Process Control Block.

Process Feedback

1. Access the Process Feedback parameter.
Change its' value to TACHOMETER EXB.
2. Refer to the manual for the Baldor Series H Control you are using for other parameter changes that depend upon the operating mode and other variables being used.

Setpoint Source

1. Access the Setpoint Source parameter.
Change its' value to TACHOMETER EXB.
2. Refer to the manual for the Baldor Series H Control you are using for other parameter changes that depend upon the operating mode and other variables being used.

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MOTORS AND DRIVES

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